EPA/OPP MICROBIOLOGY LABORATORY
ESC, Ft. Meade, MD

Standard Operating Procedure for Calibration of Thermometers

SOP Number: EQ-02-02

Date Revised: 06-17-02

Prepared By: _____Date: ___/___/___

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Print Name:_____
Laboratory Director

Date Issued: ___/___/___

Withdrawn By: _____ Date: ___/___/___

Controlled Copy No.: _____

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1.0 SCOPE AND APPLICATION:

1.1 This protocol describes the procedure used to point-check the accuracy of laboratory thermometers.

2.0 DEFINITIONS:

2.1 NIST = National Institute of Standards and Technology.

3.0 HEALTH AND SAFETY: Not applicable

4.0 CAUTIONS: None

5.0 INTERFERENCES:

5.1 Allow the thermometer to equilibrate with the solutions before taking the temperature reading.

6.0 PERSONNEL QUALIFICATIONS:

6.1 Personnel are required to be knowledgeable of the procedures in this SOP.

7.0 SPECIAL APPARATUS AND MATERIALS:

7.1 NIST traceable thermometer (ERTCO, serial number H99-106) certified annually by Ever Ready Thermometer Co., Inc.

7.2 NIST traceable thermometer (H-B Instrument Company, serial number HB/C 454091) certified annually by Ever Ready Thermometer Co., Inc.

7.3 NIST traceable Kessler maximum registration thermometers (ERTCO, serial numbers 2913, 3236, 3279, 3302, 3306, 3318, 3335, 3400, and 3801) certified annually by Ever Ready Thermometer Co., Inc. at 121°C. Thermometers are used to verify temperature in autoclaves.

7.4 Thermometers used to measure the temperature of water baths, incubators, refrigerators, and freezers, including FRIO-Temp Precision Thermometers (H-B Instrument Company). To determine which thermometers are currently in use in the laboratory, refer to the Point

Check Calibration of Laboratory Thermometers Record Book.

8.0 INSTRUMENT OR METHOD CALIBRATION: Not applicable

9.0 SAMPLE HANDLING AND STORAGE: Not applicable

10.0 PROCEDURE AND ANALYSIS:

10.1 Annual Thermometer Calibration Reports for NIST traceable thermometers (sections 7.1, 7.2, and 7.3) are stored in the Thermometers Calibration Certificates notebook.

10.2 Once a year, all of the thermometers falling under section 7.4 of this SOP are checked at operating temperatures against one of the NIST traceable thermometers (sections 7.1 and 7.2).

10.3 To point-check the accuracy of FRIO-Temp Precision Thermometers, place a flask of de-ionized water or ethanol next to the thermometer in the incubator, refrigerator, or freezer. Place the NIST traceable thermometer into the flask of de-ionized water or ethanol. Once the de-ionized water or ethanol has reached the temperature of interest, conduct the accuracy check. The NIST thermometer must be suspended in the liquid in the flask, not resting on the bottom of the flask.

10.4 A water bath is used, where applicable, to check the temperature of the thermometers (excluding the FRIO-Temp Precision Thermometers) by simultaneous immersion of the NIST traceable thermometer and the thermometer to be calibrated into the water bath at the temperature of interest. Otherwise, point checks are taken by simultaneous immersion of the thermometers in a flask of de-ionized water or ethanol and then placing the flask containing both thermometers in the instrument being monitored until the de-ionized water or ethanol reaches the temperature of interest.

10.5 Any difference in temperature readings between the NIST traceable thermometer and the laboratory thermometer is recorded on the Point Check Calibration of Laboratory Thermometers Record Form (see 16.0). A piece of label tape, displaying the correction factor, is placed around the top of the corresponding thermometer.

11.0 DATA ANALYSIS/CALCULATIONS:

11.1 The correction factor for the NIST thermometer is determined by the certified company that performs the calibration verification for this thermometer. The True Temperature measured by the NIST traceable thermometer = the Observed Temperature of the NIST traceable thermometer plus its correction factor.

11.2 The correction factor for the laboratory thermometer that is being calibrated against the NIST traceable thermometer is calculated by subtracting the Observed Temperature of the laboratory thermometer from the True temperature of the NIST traceable thermometer.

11.3 The True Temperature measured by the laboratory thermometer = the Observed Temperature plus the correction factor for that thermometer.

12.0 DATA MANAGEMENT/RECORDS MANAGEMENT:

12.1 Data will be recorded promptly, legibly and in indelible ink on the Point Check Calibration of Laboratory Thermometers Record Form. Completed forms are archived in the Point Check Calibration of Laboratory Thermometers Record Book. Annual Thermometer Calibration Reports for NIST traceable thermometers (sections 7.1, 7.2, and 7.3) are stored in the Thermometers Calibration Certificates notebook. The books are kept in a locked file cabinet in the file room D217. Only authorized personnel have access to the locked files. Archived data is subject to OPP's official retention schedule contained in SOP ADM-03, Records and Archives.

13.0 QUALITY CONTROL:

13.1 The OPP Microbiology laboratory conforms to 40 CFR Part 160, Good Laboratory Practices. Appropriate quality control measures are integrated into each SOP.

13.2 Thermometers are point checked once a year either in the laboratory or by a company certified to perform calibration verification of thermometers.

13.3 For quality control purposes, the required information is documented on the appropriate form(s) (see 16.0).

14.0 NONCONFORMANCE AND CORRECTIVE ACTION:

14.1 When routinely recording temperatures for the laboratory, laboratory equipment, media etc., the observed temperature reading of the thermometer read plus the correction factor for that specific thermometer must be recorded.

14.2 On occasion, thermometers must be discarded (e.g., broken columns, unreasonably large correction factor). Contact the facility Safety, Health, and Environmental Management Program Manager for proper disposal procedures.

15.0 REFERENCES: None

16.0 FORMS AND DATA SHEETS:

16.1 Point Check Calibration of Laboratory Thermometers Record Form

Point Check Calibration of Laboratory Thermometers Record

OPP Microbiology Laboratory

Date	Initials	Thermometer Type	Serial #	Check-point	Observed Temp.	Correction Factor *	True Temp. **
		NIST Traceable					
Description of Calibration							

Date	Initials	Thermometer Type	Serial #	Check-point	Observed Temp.	Correction Factor *	True Temp. **
		NIST Traceable					
Description of Calibration							

* Correction factor for NIST Thermometer determined by the Certification company.
Correction factor for the thermometer being calibrated is calculated by subtracting its observed temperature from true temperature of NIST Thermometer

** True Temperature of NIST Thermometer = Observed Temp.+ Correction factor :
True temperature of Thermometer being Calibrated = Observed Temp. + correction factor for that thermometer.